**BEFORE THE**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**



| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Preparation for International | ) | IC Docket No. 94-31 |
| Telecommunication Union World | ) | |
| Radiocommunication Conference | ) | |



# COMMENTS OF CONSTELLATION COMMUNICATIONS, INC.

Robert A. Mazer
Rosenman & Colin
1300 19th Street, N.W., Suite 200
Washington, D.C. 20036
(202) 463-4645

Counsel to Constellation Communications, Inc.

March 6, 1995

## TABLE OF CONTENTS

## SUMMARY

In these comments, Constellation supports the Commission's proposals to enhance the use of the 1610-1626.5 MHz and 2483.5-2500 MHz bands. In particular, Constellation urges the Commission to propose the suppression of RR 733E because it is unnecessary to protect the primary allocation status of radio astronomy and creates confusion and ambiguity concerning the primary status of the mobile satellite service in the 1610-1626.5 MHz band. Furthermore, Constellation does not believe it would be useful to propose a new footnote incorporating the radio astronomy protection rules adopted domestically in §25.213(a) of the Commission's Rules. Additionally, Constellation supports the Commission's proposal to modify RR 753F to enhance access by MSS systems to the 2483.5-2500 Mhz band.

Constellation supports the Commission's general non-GSO MSS feeder link allocation approach in the C and Ku bands under which a new footnote of the form ADD 792BX provides access to FSS bands for non-GSO MSS feeder links but with RR 2613 not applicable, and another footnote of the form ADD 792BY and MOD Resolution 46 specifies the applicable feeder link coordination procedures and sharing criteria. Constellation also believes that Resolution 46 should address only space station coordination, and that mobile and feeder link earth station coordination with terrestrial stations can be handled under the Article 11/12/13 procedures even with operations with non-GSO satellites since these facilities are likely to be operated by national entities rather than the satellite system operators. However, additional work appears needed to develop a comprehensive set of

detailed implementation proposals in view of the overlap between these new cases to be covered by the Resolution 46 procedures and the proposals contained in the Report of the Voluntary of Experts. Constellation also supports the Commission's proposals to eliminate the sub-service allocations in portions of the conventional MSS L-band at 1525-1559 MHz and 1626.5-1660.5 MHz. Finally, Constellation supports the Commission's proposals to allocate 40 MHz of uplink MSS spectrum at 1985-2025 MHz and 40 MHz of downlink MSS spectrum at 2160-2200 MHz on a world-wide primary basis in order to accommodate future LEO MSS growth.

**BEFORE THE**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Preparation for International | ) | IC Docket No. 94-31 |
| Telecommunication Union World | ) | |
| Radiocommunication Conference | ) | |

**COMMENTS OF**
**CONSTELLATION COMMUNICATIONS, INC.**

Constellation Communications, Inc. ("Constellation"),[1] by its attorneys, files these Comments in response to the Commission's Second Notice of Inquiry[2] ("Notice") in this proceeding regarding International Telecommunications Union ("ITU") World Radiocommunication Conference ("WRC") preparations. As indicated in its initial comments in this proceeding,[3] Constellation believes that the 1995 WRC can take several actions which will significantly assist the development of the mobile-satellite service ("MSS") using low-Earth orbit ("LEO") technology. In particular, Constellation demonstrated the need for (1) the modification of certain footnote provisions in order to remove ambiguity about the primary status of MSS in the 1610-1626.5 MHz band, (2) an allocation of at least 200 MHz of uplink and 200 MHz of downlink in the C-band portion of the spectrum for its LEO MSS feeder links on a priority basis without any obligations to protect use of the bands by geostationary satellite orbit ("GSO") satellites under the provisions of RR 2613, and (3)

---

[1] Constellation is an applicant for a satellite system in the 1610-1625 MHz and 2483.5-2500 MHz bands. See Application File Nos. 17-DSS-P-91(48) and CSS-91-013, as amended on November 16, 1994.

[2] FCC 95-36, released January 31, 1995.

[3] See Comments of Constellation filed on July 15, 1994 in this proceeding.

the enhancement of the 2 GHz MSS allocations for the future expansion of the Constellation's 1.6/2.4 GHz LEO MSS system. The proposals presented by the Commission in the Notice make substantial progress towards the achievement of these objectives, and Constellation supports them as discussed below.

## I. Enhancement Of The 1610-1626.5 MHz And 2483.5 - 2500 MHz Bands

With respect to the 1610-1626.5 MHz band, the Commission is proposing to modify footnote RR 731E[4] to remove any ambiguity about the primary status of MSS with respect to the aeronautical radionavigation and fixed services, but does not propose to make the analogous correction with respect to radio astronomy in RR 733E[5]. Constellation fully supports the Commission's proposal for modification of footnote RR 731E since the proposed change will remove any ambiguity concerning the primary allocation status of MSS while providing special recognition for any aeronautical radionavigation systems in the band. However, Constellation continues to believe that the suppression of RR 733E is also required.

RR 733E currently provides that "[h]armful interference shall not be caused to stations of the radio astronomy service using the band 1610.6-1613.8 MHz by stations of the radiodetermination-satellite and mobile-satellite services." This footnote was initially adopted at the 1987 World Administrative Radio Conference ("WARC") when allocations were made to the radiodetermination-satellite service ("RDSS"). At the time, radio

---

[4] See Proposal No. 3/B-LEO at 7.

[5] See Notice at para. 27.

astronomy had secondary status under RR 734, and RR 733E was limited to Regions 1 and 3 where RDSS was allocated on a secondary basis.[6] The elevation of radio astronomy from secondary to primary status by the 1992 WARC provides radio astronomy with all of the protection it requires with respect to the introduction of the MSS (or any other service) in the 1610-1626 MHz band. However, even though radio astronomy was upgraded to primary status, RR 733E was somehow retained and the restriction of this footnote provision to Regions 1 and 3 was removed in the Final Acts of the 1992 WARC.

Because the language of RR 733E is the same as that used to define a secondary service,[7] retention of this provision is tantamount to reducing MSS to secondary status in direct contradiction to the inclusion of MSS as a primary service (along with radio astronomy) in the table of frequency allocations. Thus, the reason given in support of the deletion of the last sentence of the current text of RR 731E is equally applicable to the current RR 733E.[8] Specifically, the Commission should propose suppression of RR 733E because it is "unnecessary to protect the primary allocation status of [radio astronomy] and creates confusion and ambiguity concerning the primary status of the mobile-satellite service in the 1610-1626.5 MHz band."

Moreover, suppression of RR 733E will not eliminate the special recognition of radio

---

[6] See Final Acts of the 1987 WARC at 68. RR 733E was not applied to Region 2 where RDSS was allocated on a primary basis.

[7] See RR 420-421.

[8] See Proposal No. 3/B-LEO at 7.

astronomy provided by RR 734 in this band.[9] The Commission is proposing no change to RR 734 which provides that:

> In making assignments to stations of other services, administrations are urged to take all practicable steps to protect the radio astronomy service in the bands 1610-1610.8 MHz from harmful interference. Emissions from space or air-borne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 343 and 344 and Article 36).

Thus, there is simply no need to retain RR 733E except to derogate the status of MSS to secondary status in contradiction to the co-primary table status granted the two services in 1992. Constellation therefore urges the Commission to propose suppression of this footnote to correct this oversight in the Final Acts of the 1992 WARC.

Constellation does not believe it would be useful to propose a new footnote incorporating the radio astronomy protection rules adopted domestically in §25.213(a) of the Commission's Rules.[10] It would be impractical to identify specific radio astronomy protection zones within the radio regulations as is done in the Commission's Rules or to specify a new procedure unique to this band. Administrations will have adequate notice of any proposed MSS earth station operations well outside of any radio astronomy protection

---

[9] Constellation notes that the Report of the Voluntary Group of Experts ("VGE") proposes the suppression of RR 734 in order to consolidate the substance of RR 734 in a modified version of RR 533. See VGE Report, Part A, Section 3.141 at 18. The VGE Report proposal for no change to RR 733E in Part B only means that RR 733E could not be included in the editorial consolidation of a large number of common radio astronomy footnote texts in RR 533.

[10] See Notice at para. 27. It should also be noted that the United States proposal to extend its domestic sharing arrangement between the RDSS and radio astronomy into the international regulations was rejected by the international radio astronomy community at the 1987 WARC.

zones,[11] and the refinement of radio astronomy protection requirements can be best left to the ongoing activities of the ITU's Radiocommunication Sector.

Constellation notes that the Commission is proposing to delete the 5000-5250 MHz and 15.4-15.7 GHz bands from RR 733 which provides for an aeronautical mobile-satellite (R) service ("AMS(R)S") allocation, but not the 1610-1626.5 MHz band.[12] While Constellation supports this proposed modification of RR 733, it is not clear why the Commission is not proposing the suppression of RR 733 in its entirety. Constellation is not aware of any AMS(R)S requirement in this band, and the 16.5 MHz of spectrum remaining in RR 733 does not appear to be sufficient to support any practical system.[13] The Commission has not identified any reason for retaining this AMS(R)S allocation in the 1610-1626.5 MHz band, and Constellation therefore proposes that the Commission modify its proposals to suppress RR 733 in its entirety.

Constellation supports the Commission's proposal to modify RR 753F to enhance access by MSS systems to the 2483.5-2500 MHz band. The modified RR 753F would require coordination of space stations with terrestrial services only if the power flux density ("PFD") exceeds -137dB($W/m^2/4kHz$) for elevation angles of 25° and higher and -150 dB($W/m^2/4kHz$) for elevations of 5° and below, with linear interpolation for elevation

---

[11] For example, Resolution 46 requires notification of mobile earth station operations within 500 km of the border of an administration while the radius of the largest radio astronomy protection zones in §25.213(a) is 160 km.

[12] The Notice indicates a MOD 733 under Proposal No. 1/FL-MSS at 3 but NOC 733 under Proposal No. 3/B-LEO at 6.

[13] Constellation also notes that AMS(R)S requirements are to be satisfied in the 1545-1559 MHz and 1646.5-1660.5 MHz bands under the provisions of MOD 730C. See Proposal No. 3/B-LEO at 4.

angles between 5° and 25°.[14] This proposal will provide adequate protection of terrestrial services in this band while permitting higher MSS system capacity, particularly in serving users at the edge of a satellite's coverage area.[15] Adoption of this proposal by WRC-95 will therefore significantly enhance the development of LEO MSS systems in this band.

## II. LEO MSS Feeder Link Bands

Constellation is proposing to use the 5050-5250 MHz and 6825-7025 MHz bands for its feeder links.[16] Constellation has also indicated its requirement for C-band spectrum because the favorable propagation conditions at these frequencies are needed to support multiple gateways accessing earth coverage satellite antenna beams of multiple code division

---

[14] Because LEO systems operate on a global basis, it is necessary to set the coordination trigger value at a PFD level that can be met by the LEO systems and thus avoid coordination with every country in the world. If several LEO MSS systems operate in the band under an interference sharing arrangement, the systems will still have to agree on a common aggregate system PFD level irrespective of the specific PFD level specified as a coordination trigger for coordination with terrestrial services. See Attachment 1 to Annex 1 to the Report of the MSS Above 1 GHz Negotiated Rulemaking Committee, April 6, 1994 in CC Docket No. 92-166. However, Constellation believes that the Commission's proposal will provide additional flexibility in coordinating single satellite and aggregate system PFD levels.

[15] Constellation's current satellite design is based on operating at a maximum -142 dB($W/m^2/4kHz$) PFD. To avoid coordination, the satellite power must be reduced over areas served with an elevation angle less than 25% which reduces system capacity in these areas. Under the Commission's proposal, Constellation can operate with a -142 dB($W/m^2/4kHz$) PFD level without loss of capacity to serve users down to an elevation angle of about 17.3° where the coverage areas of its satellites begin to overlap.

[16] This 200 MHz of feeder link spectrum is needed to support 32 spot beams in the L/S-bands, each with a transponder bandwidth of 12 MHz, as well as telemetry, tracking and command functions. See Constellation's November 16, 1994 Amendment, Appendix A, Tables 1-A and 1-B for the detailed Constellation frequency plan.

multiple access ("CDMA") systems.[17] Constellation also believes that LEO MSS feeder links should not be subject to the requirements of protecting GSO satellites in the fixed satellite service ("FSS") under the provisions of RR 2613. Constellation believes that the Commission's proposals[18] will satisfy the current requirements for non-GSO 1-3 GHz MSS system feeder links, and therefore supports these proposals.[19]

Constellation supports the Commission's general non-GSO MSS feeder link allocation approach in the C and Ku bands under which a new footnote of the form ADD 792BX provides access to FSS bands for non-GSO MSS feeder links but with RR 2613 not applicable, and another footnote of the form ADD 792BY and MOD Resolution 46 specifies the applicable feeder link coordination procedures and sharing criteria.[20] Constellation also believes that Resolution 46 should address only space station coordination, and that mobile and feeder link earth station coordination with terrestrial stations can be handled under the Article 11/12/13 procedures even with operations with non-GSO satellites since these facilities are likely to be operated by national entities rather than the satellite system operators. However, additional work appears needed to develop a comprehensive set of

---

[17] See Comments of Constellation Communications filed May 5, 1994 at Appendix C in CC Docket no. 92-166.

[18] See Proposal No. 1/FL-MSS.

[19] Constellation is concerned that the proposed text of MOD RR 797 will create uncertainty over the long-term status of non-GSO MSS feeder links in the 5000-5250 MHz band. In particular, it is not clear how the precedence of the microwave landing system expansion outside of the 5030-5091 MHz band would be accomplished vis-a-vis operational non-GSO MSS feeder earth stations requiring more than 30 MHz of bandwidth after the year 2015. Clarification of how this provision would be implemented in practice is desirable.

[20] See Notice at para. 48 and n.69.

detailed implementation proposals in view of the overlap between these new cases to be covered by the Resolution 46 procedures and the proposals contained in the Report of the Voluntary of Experts.

Constellation also notes that the PFD levels specified in MOD 2567(b) are -154 and -144 dB(W/m$^2$/4kHz), which are 2 dB more stringent than normal values of -152 and -142 dB(W/m$^2$/4kHz) specified for this portion of the spectrum in the preceding provision (a) (RR 2566). Moreover, the PFD levels specified in analogous provisions MOD RR 2575(b) for the 12.75-13.25 GHz band and MOD 2578(b) for the 19.2-19.7 GHz band are the same as the normal PFD limits specified in RR 2574 and RR 2578 (a), respectively. Since no explanation was given in the text of the Notice for different treatment of the 6825-7075 MHz band. Constellation believes the Commission should correct its proposed MOD 2567 (b) to specify values of -152 and -142 db(W/m$^2$/4kHz) instead of -154 and -144 dB(W/m$^2$/4kHz).

## III. Other MSS Allocations Between 1 And 3 GHz

Constellation supports the Commission's other proposals regarding the MSS between 1 and 3 GHz. The accommodation of MSS requirements in this portion of the spectrum was one of the most difficult issues addressed by the 1992 WARC, the Commission's proposals[21] will enhance the future development of MSS.

In particular, Constellation supports the Commission's proposals to eliminate the sub-service allocations in portions of the conventional MSS L-band at 1525-1559 MHz and

---

[21] See Proposal No. 3/B-LEO at 1-4 and 8-14.

1626.5-1660.5 MHz. Allocation of these bands entirely to the generic MSS is a long standing United States position that will increase the efficiency and flexibility with which the bands are used by GSO MSS systems, while still providing the necessary priority for the safety and distress services provided by the systems in these bands. Such efficiency and flexibility is necessary to accommodate the requirements of current and proposed system operators, such as the American Mobile Satellite Corporation in the United States, Inmarsat for maritime and aeronautical services, and the growing number of other national and regional GSO MSS systems in these bands.

Constellation is convinced that LEO MSS satellite systems will play a vital role in the development of new personal communications services on a national and global basis. For this reason, the 2 GHz MSS bands are critical to the future growth and development of the initial LEO MSS systems that will begin operation in the 1.6/2.4 GHz MSS/RDSS bands. The 1992 WARC made primary allocations in the bands 1980-2010 MHz (plus 1970-1980 MHz in Region 2) for MSS uplinks and 2170-2200 MHz (plus 2160-2170 MHz in Region 2) for MSS downlinks in the 2 GHz portion of the spectrum. Modification of these international allocations is necessary in light of the Commission's decision to allocate portions of these bands to terrestrial personal communications services.[22] Expansion of the worldwide MSS allocations to 40 MHz in each direction of transmission beyond the 35

---

[22] In allocating the 1850-1990 MHz band to these new services, the Commission has effectively eliminated the use of the bottom 20 MHz of the international MSS allocation by future MSS systems. See Memorandum Opinion and Order in GEN Docket No. 90-314, FCC 94-144 released June 13, 1994. The Commission is proposing to correct this situation with the release of its Notice of Proposed Rulemaking in ET Docket No. 95-18, FCC 95-39 released January 31, 1995, allocating 35 MHz to MSS in each direction of transmission.

MHz currently proposed domestically will provide long-term MSS growth potential once any necessary terrestrial system relocations are completed.[23] Constellation therefore supports the Commission's proposals to allocate 40 MHz of uplink MSS spectrum at 1985-2025 MHz and 40 MHz of downlink MSS spectrum at 2160-2200 MHz on a world-wide primary basis in order to accommodate future LEO MSS growth.

Because LEO MSS systems inherently operate on a global basis, this technology can be implemented only in bands that have worldwide allocations, such as the 2 GHz MSS bands. On the other hand, GSO MSS systems are inherently national or regional since the satellites are fixed in relation to their geographic coverage area. There are other bands already allocated between 1 and 3 GHz which are being used or can be used by GSO MSS systems.[24] Since the 2 GHz MSS bands are the only new MSS bands between 1 and 3 GHz that are allocated on a worldwide basis and that can be implemented in the United States as a practical matter, Constellation believes that the 2 GHz MSS bands should be reserved for global MSS systems using LEO technology.[25]

---

[23] The 5 MHz of additional uplink MSS spectrum is at 1985-1990 MHz which is allocated to personal communications services in GEN Docket No. 90-314. This additional 5 MHz of MSS spectrum being proposed to WRC-95 will benefit any United States LEO MSS satellite design even if the band could not be used in this country.

[24] Existing allocations available for GSO MSS systems include 1492-1525 MHz, 1525-1559 MHz, 1626.5-1660.5 MHz, 1675-1710 MHz, 2500-2520 MHz and 2670-2790 MHz. While some of these bands may not be usable in the United States, there are enough options to provide growth for national and regional GSO MSS systems. In particular, if additional GSO MSS spectrum is needed in the United States, consideration should be given to upgrading the secondary Region 2 downlink MSS allocation at 2120-2160 MHz to a primary footnote allocation that can be matched with the primary Region 2 uplink MSS allocation at 1675-1710 MHz.

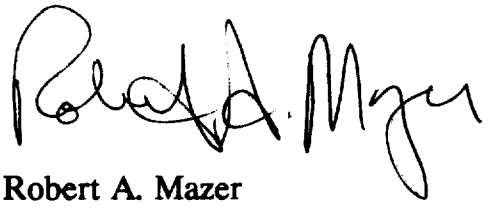
[25] With respect to the question of advancing the 2005 date for implementation of the 2 GHz MSS bands, Constellation supports the views of the Commission and its Industry

(continued...)

## CONCLUSION

Constellation supports the Commission's proposals to enhance the use of the 1610-1626.5 MHz and 2483.5-2500 MHz bands, to provide non-GSO MSS feeder link allocations, and to enhance the 2 GHz MSS allocations for future non-GSO MSS development with the further proposals regarding SUP RR 7446, SUP RR 733 and MOD 2567 discussed above. Constellation believes that additional work is needed to develop a comprehensive set of proposals to improve the non-GSO coordination procedures (particularly in the feeder link bands) and intends to actively participate in the Commission's preparatory activities in this regard.

Respectfully submitted,



Robert A. Mazer
Rosenman & Colin
1300 19th Street, N.W., Suite 200
Washington, D.C. 20036
(202) 463-4645

March 6, 1995

Counsel to Constellation Communications, Inc.

---

[25](...continued)
Advisory Committee that no proposal is necessary until there is an overall transition plan. See Notice at paras. 66-67.

## CERTIFICATE OF SERVICE

I, Robert A. Mazer, hereby certify that the foregoing "Comments of Constellation Communications, Inc." was served by hand or first-class mail, postage prepaid, this 6th day of March, 1995, on the following persons:

Scott Blake Harris, Chief*
International Bureau
Federal Communications Commission
2000 M Street, N.W., Room 800
Washington, DC 20554

Thomas S. Tycz, Chief*
Satellite & Radiocommunication Division
International Bureau
Federal Communications Commission
2000 M Street, N.W. Room 520
Washington, DC 20554

Cecily C. Holiday, Deputy Chief*
Satellite & Radiocommunication Division
International Bureau
Federal Communications Commission
2000 M Street, N.W. Room 520
Washington, DC 20554

Fern J. Jarmulnek, Chief*
Satellite Policy Branch
Satellite & Radiocommunication Division
International Bureau
Federal Communications Commission
2000 M Street, N.W., Fifth Floor
Washington, DC 20554

Ms. Kristi Kendell*
Satellite Policy Branch
Satellite & Radiocommunication Division
International Bureau
Federal Communications Commission
2000 M Street, N.W., Fifth Floor
Washington, DC 20554

Albert Halprin, Esq.
Halprin, Temple & Goodman
Suite 650 East Tower
1100 New York Avenue, N.W.
Washington, DC 20005
(Counsel for ORBCOMM)

Raul R. Rodriguez, Esq.
Leventhal, Senter & Lerman
2000 K Street, N.W., Suite 600
Washington, DC 20006
(Counsel for STARSYS)

Henry Goldberg, Esq.
Goldberg, Godles, Wiener & Wright
1229 19th Street, N.W.
Washington, DC 20036
(Counsel for VITA)

Philip V. Otero, Esq.
Vice President & General Counsel
GE American Communications, Inc.
Four Research Way
Princeton, New Jersey 08540
(Counsel for GE Americom)

Leslie A. Taylor, Esq.
Leslie Taylor Associates
6800 Carlynn Court
Bethesda, MD 20817-4301
(Counsel for E-Sat, Inc.)

Albert J. Catalano, Esq.
Ronald J. Jarvis, Esq.
Catalano & Jarvis, P.C.
1101 30th Street, N.W.
Suite 300
Washington, DC 20007
(Counsel for Final Analysis)

Jill Abeshouse Stern, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N Street, N.W.
Washington, DC 20037
(Counsel for CTA)

John T. Scott, Esquire
William D. Wallace, Esquire
Crowell & Moring
1001 Pennsylvania Avenue, N.W.
Washington, DC 20004-2505

Norman R. Leventhal, Esquire
Raul R. Rodriguez, Esquire
Stephen D. Baruch, Esquire
Leventhal Senter & Lerman
2000 K Street, N.W., Suite 600
Washington, DC 20006-1809

Veronica Haggert, Esquire
Motorola, Inc.
1350 Eye Street, N.W.
Suite 400
Washington, DC 20005

Philip L. Malet, Esquire
Alfred M. Mamlet, Esquire
Steptoe & Johnson
1330 Connecticut Avenue, N.W.
Washington, DC 20036

Dr. T. Stephen Cheston
Mr. James G. Ennis
Mr. Barry Lambergman
Iridium, Inc.
1401 H Street, N.W.
Washington, DC 20005

Robert A. Mansbach
COMSAT Corporation
COMSAT World Systems
6560 Rock Spring Drive
Bethesda, MD 20817

John L. Bartlett, Esquire
Wiley Rein & Fielding
1776 K Street, N.W.
Washington, DC 20006

Leonard Robert Raish, Esquire
Fletcher Heald & Hildreth
1300 N. 17th Street, 11th Floor
Rosslyn, VA 22209

David A. Gross
AirTouch Communications
1818 N Street, N.W.
Washington, DC 20036

Thomas J. Keller, Esquire
Verner Liipfert Bernhard
McPherson & Hand, Chartered
901 15th Street, N.W., Suite 700
Washington, DC 20005
(Counsel for The Association of
American Railroads)

Tom W. Davidson, P.C.
Akin Gump Strauss Hauer & Feld LLP
1333 New Hampshire Avenue, N.W.
Suite 400
Washington, DC 20036
(Counsel for Teledesic Corporation)

Christopher D. Imlay, Esquire
Booth Freret & Imlay
1233 20th Street, N.W., Suite 204
Washington, DC 20036
(Counsel for The American Radio
Relay League, Incorporated)

Gary M. Epstein
John P. Janka
Mary E. Britton
Latham & Watkins
1001 Pennsylvania Avenue, N.W.
Washington, DC 20004
(Counsel for Hughes Space and Communications
Company and Hughes Communications Galaxy, Inc.)

Nancy J. Thompson
COMSAT Mobile Communications
22300 COMSAT Drive
Clarksburg, MD 20781

Molly Pauker, Vice President
Corporate & Legal Affairs
Fox, Inc. & Fox Television Stations
5151 Wisconsin Avenue, N.W.
Washington, DC 20016

Henry L. Bauman
Barry D. Umansky
Kelly T. Williams
National Association of Broadcasters
1771 N Street, N.W.
Washington, DC 20036

Howard Monderer
National Broadcasting Company
1229 Pennsylvania Avenue, N.W.
11th Floor
Washington, DC 20004

Howard N. Miller, Senior V.P.
Broadcast Operations, Engineering
and Computer Services
1320 Braddock Place
Alexandria, VA 22314
(Counsel for Public Broadcasting Services)
Julian L. Shepard
Victor Tawil
Assoc. for Maximum Service TV, Inc.
1776 Massachusetts Ave., N.W.
Suite 300
Washington, DC 20044

Jonathan D. Blake
Kurt A. Wimmer
Ronald J. Krotoszynski, Jr.
Covington & Burling
P.O. Box 7566
Washington, DC 20044
(Counsel for Association for Maximum Service Television, Inc.)

Sam Antar, Vice President
Law and Regulation
Capital Cities/ABC, Inc.
77 West 66th Street, 16th Fl.
New York, NY 10023

Mark W. Johnson
CBS, Inc.
1634 Eye Street, N.W.
Washington, DC 20006

J. Laurent Scharff
Reed Smith Shaw & McClay
1200 18th Street, N.W.
Washington, DC 20036

Charles W. Kelly, Jr., President
Society of Broadcast Engineers
8445 Keystone Crossing
Suite 140
Indianapolis, IN 46240

Robert A. Mazer

---

* Hand Delivered